Summary of Claimed Subject Matter

Claimed embodiments of the invention provide an apparatus (100, 300, 400, Figures 1-2A, 3 and 4A, lines 6-19 and 23-24 of page 5, line 31 of page 8, line 16 of page 9) for controlling the flow of a gas between a process region (180, Figure 1, lines 14 and 25 of page 4) and an exhaust port (135, Figure 1, lines 1-3, and lines 10 of page 5) in a semiconductor substrate processing chamber (110, Figure 1, lines 4, 8, 12-13, 26 of page 4, lines 1 and 5 of page 5, Abstract). In the embodiment of independent claim 1, an apparatus (100, 300, 400, Figures 1-2A, 3 and 4A, lines 6-19 and 23-24 of page 5, line 31 of page 8, line 16 of page 9) for controlling the flow of a gas between a process region (180, Figure 1, lines 14 and 25 of page 4) and an exhaust port (135, Figure 1, lines 1-3 and 10 of page 5) in a semiconductor substrate processing chamber (110, Figure 1, lines 4, 8, 12-13, 26 of page 4, lines 1 and 5 of page 5) includes at least one restrictor plate (208, Figure 2A, line 26 of page 5, lines 18 and 29-30 of page 6, lines 1-2, 8, 14, 20, 24 and 26 of page 7, lines 2, 5-6, 11-12, 18, 24 of page 8) supported within the semiconductor processing chamber (110, Figure 1, lines 4, 8, 12-13, 26 of page 4, lines 1 and 5 of page 5) by a plurality of support pins (204, Figure 2A, line 25 of page 5, lines 13-14, 24-28 of page 6, line 23 of page 7) and adapted to at least partially circumscribe a substrate support pedestal (116, Figure 1, lines 12-15, 27 of page 4, lines 7, 20 and 28 of page 5), the restrictor plate (208, Figure 2A, line 26 of page 5, lines 18 and 29-30 of page 6, lines 1-2, 8, 14, 20, 24 and 26 of page 7, lines 2, 5-6, 11-12, 18, 24 of page 8) adapted to control the flow of at least one gas flowing between the process region (180, Figure 1, lines 14 and 25 of page 4) and the exhaust port (135, Figure 1, lines 1-3 and 10 of page 5).

In the embodiment of independent claim 10, a semiconductor substrate processing system includes a processing chamber (110, Figure 1, lines 4, 8, 12-13, 26 of page 4, lines 1 and 5 of page 5), a substrate support pedestal (116, Figure 1, lines 12-15, 27 of page 4, lines 7, 20 and 28 of page 5) disposed in the chamber (110, Figure 1, lines 4, 8, 12-13, 26 of page 4, lines 1 and 5 of page 5), a gas inlet (132, Figure 1, lines 14-17 of page 4) formed in the chamber (110, Figure 1, lines 4, 8, 12-13, 26 of page 4, lines 1 and 5 of page 5) above the pedestal (116, Figure 1, lines 12-15, 27 of page 4, lines 7, 20 and 28 of page 5) for supplying a process gas into a process region

(180, Figure 1, lines 14 and 25 of page 4) above the support pedestal (116, Figure 1, lines 12-15, 27 of page 4, lines 7, 20 and 28 of page 5), an exhaust port (135, Figure 1, lines 1-3 and 10 of page 5) formed in a wall (130, Figure 1, lines 5-7 of page 4, lines 7 and 18 of page 5) of the chamber (110, Figure 1, lines 4, 8, 12-13, 26 of page 4, lines 1 and 5 of page 5), and at least one restrictor plate (208, Figure 2A, line 26 of page 5, lines 18 and 29-30 of page 6, lines 1-2, 8, 14, 20, 24 and 26 of page 7, lines 2, 5-6, 11-12, 18 and 24 of page 8) supported within the processing chamber (110, Figure 1, lines 4, 8, 12-13, 26 of page 4, lines 1 and 5 of page 5) by a plurality of support pins (204, Figure 2A, line 25 of page 5, lines 13-14, 24-28 of page 6, line 23 of page 7) and at least partially circumscribing the substrate support pedestal (116, Figure 1, lines 12-15, 27 of page 4, lines 7, 20 and 28 of page 5), the restrictor plate (208, Figure 2A, line 26 of page 5, lines 18 and 29-30 of page 6, lines 1-2, 8, 14, 20, 24 and 26 of page 7, lines 2, 5-6, 11-12, 18 and 24 of page 8) adapted to control the flow of at least one gas flowing between the process region (180, Figure 1, lines 14 and 25 of page 4) and the exhaust port (135, Figure 1, lines 1-3 and 10 of page 5).

In the embodiment of independent claim 23, a semiconductor substrate processing system includes a processing chamber (110, Figure 1, lines 4, 8, 12-13, 26 of page 4, lines 1 and 5 of page 5), a substrate support pedestal (116, Figure 1, lines 12-15, 27 of page 4, lines 7, 20 and 28 of page 5) disposed in the processing chamber (110, Figure 1, lines 4, 8, 12-13, 26 of page 4, lines 1 and 5 of page 5), a gas inlet (132, Figure 1, lines 14-17 of page 4) formed in the chamber (110, Figure 1, lines 4, 8, 12-13, 26 of page 4, lines 1 and 5 of page 5) above the pedestal (116, Figure 1, lines 12-15, 27 of page 4, lines 7, 20 and 28 of page 5) for supplying a process gas into a process region (180, Figure 1, lines 14 and 25 of page 4) above the support pedestal (116, Figure 1, lines 12-15, 27 of page 4, lines 7, 20 and 28 of page 5), an exhaust port (135, Figure 1, lines 1-3 and 10 of page 5) formed in a wall (130, Figure 1, lines 5-7 of page 4, lines 7 and 18 of page 5) of the processing chamber (110, Figure 1, lines 4, 8, 12-13, 26 of page 4, lines 1 and 5 of page 5), and a restrictor plate (208, Figure 2A, line 26 of page 5, lines 18 and 29-30 of page 6, lines 1-2, 8, 14, 20, 24 and 26 of page 7, lines 2, 5-6, 11-12, 18 and 24 of page 8) supported within the processing chamber (110, Figure 1, lines 4, 8, 12-13, 26 of page 4, lines 1 and 5 of page 5) in a laterally space-apart

relation relative to the substrate support pedestal (116, Figure 1, lines 12-15, 27 of page 4, lines 7, 20 and 28 of page 5) and sidewalls (130, Figure 1, lines 5-7 of page 4, lines 7 and 18 of page 5) of the processing chamber (110, Figure 1, lines 4, 8, 12-13, 26 of page 4, lines 1 and 5 of page 5), wherein a first predetermined gap (160, Figure 1, lines 17-22 of page 5) is between the substrate support pedestal (116, Figure 1, lines 12-15, 27 of page 4, lines 7, 20 and 28 of page 5) and the restrictor plate (208, Figure 2A, line 26 of page 5, lines 18 and 29-30 of page 6, lines 1-2, 8, 14, 20, 24 and 26 of page 7, lines 2, 5-6, 11-12, 18 and 24 of page 8), and a second predetermined gap (158, Figure 1, lines 17-22 of page 5) is between the restrictor plate (208, Figure 2A, line 26 of page 5, lines 18 and 29-30 of page 6, lines 1-2, 8, 14, 20, 24 and 26 of page 7, lines 2, 5-6, 11-12, 18 and 24 of page 8) and the sidewalls (130, Figure 1, lines 5-7 of page 4, lines 7 and 18 of page 5) of the processing chamber (110, Figure 1, lines 4, 8, 12-13, 26 of page 4, lines 1 and 5 of page 5), and wherein the restrictor plate (208, Figure 2A, line 26 of page 5, lines 18 and 29-30 of page 6, lines 1-2, 8, 14, 20, 24 and 26 of page 7, lines 2, 5-6, 11-12, 18 and 24 of page 8) at least partially circumscribes the substrate support pedestal (116, Figure 1, lines 12-15, 27 of page 4, lines 7, 20 and 28 of page 5) and is adapted to control the flow of at least one gas flowing between the process region (180, Figure 1, lines 14 and 25 of page 4) and the exhaust port (135, Figure 1, lines 1-3 and 10 of page 5).

In the embodiment of independent claim 28, a semiconductor substrate processing system includes a processing chamber (110, Figure 1, lines 4, 8, 12-13, 26 of page 4, lines 1 and 5 of page 5), a substrate support pedestal (116, Figure 1, lines 12-15, 27 of page 4, lines 7, 20 and 28 of page 5) disposed in the processing chamber (110, Figure 1, lines 4, 8, 12-13, 26 of page 4, lines 1 and 5 of page 5), a gas inlet (132, Figure 1, lines 14-17 of page 4) formed in the processing chamber (110, Figure 1, lines 4, 8, 12-13, 26 of page 4, lines 1 and 5 of page 5) above the pedestal (116, Figure 1, lines 12-15, 27 of page 4, lines 7, 20 and 28 of page 5) for supplying a process gas into a process region (180, Figure 1, lines 14 and 25 of page 4) defined in the processing chamber (110, Figure 1, lines 4, 8, 12-13, 26 of page 4, lines 1 and 5 of page 5) above the support pedestal (116, Figure 1, lines 12-15, 27 of page 4, lines 7, 20 and 28 of page 5), an exhaust port (135, Figure 1, lines 1-3 and 10 of page 5) formed in a wall

(130, Figure 1, lines 5-7 of page 4, lines 7 and 18 of page 5) of the processing chamber (110, Figure 1, lines 4, 8, 12-13, 26 of page 4, lines 1 and 5 of page 5), a restrictor plate (208, Figure 2A, line 26 of page 5, lines 18 and 29-30 of page 6, lines 1-2, 8, 14, 20, 24 and 26 of page 7, lines 2, 5-6, 11-12, 18 and 24 of page 8) supported within the processing chamber (110, Figure 1, lines 4, 8, 12-13, 26 of page 4, lines 1 and 5 of page 5) in a laterally space-apart relation relative to the support pedestal (116, Figure 1, lines 12-15, 27 of page 4, lines 7, 20 and 28 of page 5) and sidewalls (130, Figure 1, lines 5-7 of page 4, lines 7 and 18 of page 5) of the processing chamber (110), the restrictor plate (208, Figure 2A, line 26 of page 5, lines 18 and 29-30 of page 6, lines 1-2, 8, 14, 20, 24 and 26 of page 7, lines 2, 5-6, 11-12, 18 and 24 of page 8) at least partially circumscribing the substrate support pedestal (116, Figure 1, lines 12-15, 27 of page 4, lines 7, 20 and 28 of page 5) and positioned above the exhaust port (135, Figure 1, lines 1-3 and 10 of page 5) and a plurality of pins (204) extending between the restrictor plate (208, Figure 2A, line 26 of page 5, lines 18 and 29-30 of page 6, lines 1-2, 8, 14, 20, 24 and 26 of page 7, lines 2, 5-6, 11-12, 18 and 24 of page 8) and a bottom (108, Figure 1, line 13 of page 4, lines 16 and 26, 29 and 32-34 of page 5) of the processing chamber (110, Figure 1, lines 4, 8, 12-13, 26 of page 4, lines 1 and 5 of page 5).